THE FUTURE OF PLACER MINING IN THE YUKON

By

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Until very recently placer gold mining had been the Yukon's principle industry for over fifty years. Silver mining is now the leading producer of mineral wealth but the placer industry continues to make an important contribution to the economy of the Territory. The effect of the impulse given to the development of the Yukon by gold mining is much in evidence throughout the Territory. Both settlements of Dawson and Whitehorse owe their origins to placer gold mining; Dawson as a mining town and Whitehorse as a transportation centre serving placer Gold mining. The Whitepass route of the British Yukon Navigation company was established primarily to serve the placer gold mining industry. The rich deposits of silver were found in the Mayo area by prospectors searching for gold. The outlook for the industry can only be seen in true perspective through a knowledge of the broader features of its past achievements.

Before 1896 such placer gold mining industry as there was, was conducted by a few individuals and was of little real significsnce. This state of affairs changed dramatically in 1896 with the discovery of the Klondike deposits from which, to date, over 375 tons of gold have been produced. These deposits are remarkable not only for their high gold content, but for their great extent. The combination of these two desirable features makes the Klondike area one of the major placer gold camps in the world. About 100 miles of watercourse contained deposits workable gravels. Within ten years of discovery vertually all the bonanza grade material had been mined and the area had little further appeal to the many independent miners who had relied on very primitive mining methods for their livelihood. During this period the Yukon produced almost 100% of the gold mined in Canada. Since then the combined effects of the lower value of material mined and the discovery of extensive hard rock deposits of gold in Eastern Canada have reduced the Yukon's contribution to Canada's annual gold production to about 1½%. This is still won entirely from placer deposits and amounts to about $2 million a year. In the first ten years following discovery of the Klondike, the Yukon produced gold which would be valued at $200 million at today's price. That such an enormous quantity of gold could be won in so short a space of time, by primitive means, and under such severe conditions, speaks for both the value of the deposits and the industry of the pioneer miners. We have no exact figures of the number of individuals who were working their own claims during this time, nor of the number of itinerant labourers who hired out to help with this work, but both figures were in the order of many thousands. Today there are possibly not more than sixty men engaged on small placer mining ventures within the Territory. At the peak of mining activity thriving settlements sprang up throughout the areas of greater production. Most of these have now vanished almost without a trace.

No sooner had the interest of the individual miners begun to wane in the Klondike area than promoters began to consolidate large groups of claims with the object of attracting capital to finance large scale mechanical mining. At that time mining practices for the handling of large quantities of low grade placer gold bearing gravel had recently been carried to a high degree of perfection in the gold fields of California. These were applied to the working of both the Klondike deposits and those of lesser extent elsewhere in the Yukon, in the Sixty and Forty-mile rivers West of Dawson, in the Stewart River Valley South of Dawson and in several of the wider creeks in the Mayo area. In all of these bucket line dredges were constructed of Californian type. Through excessive enthusiasm and an under-estimation of the difficulties imposed by local conditions which is found extensively in the Yukon, many of the early operations of this type were financial failures.

In spite of these early set-backs, the dredge has been the principle producer of gold in the Yukon since its introduction. In the Klondike area alone over 300,000,000 cubic yards of material have

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been dredged since 1908 and production by this means is still at the rate of over 4,000,000 cubic yards a year from the five dredges now in use. This is equivalent to 30,000 tons a day during the operating season. Over $15 million have been returned to the share-holders from these operations, which have yielded about $100 million in gold at the present price of $35 per ounce. In recent years about 20% of the gross value of the gold produced has gone in payments of various taxes and licences. One salient feature emerges from a study of the economics of dredging in the Yukon during the last 55 years. This is that the only continuously successful operations have been those which were large enough to run their own self sufficient service departments and electricity generating plant and which had sufficient mining reserves to permit the economies of several producing units. An operation of this type requires a very high investment of capital to equip it adequately.

Three conditions in the Yukon present major physical difficulties in the way of successful placer mining. These are present in all placer areas in the Yukon, to a greater or lesser degree. Of these difficulties the restriction of mining operations to the warmer part of the year is the most onerous. This is because all mining operations are conducted at surface and a copious water supply is required by any one of them for the extraction of gold. The annual temperature variation is 150 degrees Fahrenheit between extremes. Mining is possible only in the upper half of this range. In the more favourable areas dredges seldom work for much more than 200 days in a year. Even then near zero temperatures are common at both beginning and end of the season. Small scale hydraulicking and bulldozer mining are even more drastically restricted. A secondary effect of this seasonal limitation on work is the increasing tendency for labour connected with the industry to leave the Yukon for the winter months and to take the greater part of their earnings with them.

Extensive permafrost in the gold bearing gravels effectively more than doubles the overall mining cost as the gravel must be thawed before it can be mined efficiently by any of the mechanical methods now in use. Permafrost was a great aid to the pioneer miners who were able to mine high grade pay streaks in gravel under thick deposits of barren overburden where the complete section was frozen. Precipitation is slight in all the important placer camps in the Yukon with the result that water for artificial thawing and hydraulicking is often in short supply. The difficulties involved in obtaining an adequate water supply for hydraulic operations are well illustrated by the seventy mile long system of flumes, ditches and syphons which were required to bring sufficient water to hydraulic 35 million cubic yards of gravel from the hillsides along the Western side of Bonanza Creek near Dawson. At its peak capacity this water system provided about 55,000 gallons a minute.

Over the years numerous technical improvements and innovations to reduce the effects of these adverse features have been perfected in the Yukon while others have been introduced from Alaska, where mining conditions are almost identical. Without a doubt the most valuable advances have been made in artificial thawing practice. To this day independent miners thaw their ground by natural means. The gold bearing gravel and its waste cover of muck is stripped away by bulldozer or water under pressure as it thaws by solar radiation and rain. Such a procedure is not suited to the large areas required for a dredging operation and the ground must be thawed by artificial means. This was achieved originally by forcing steam through pipes driven into the ground. A cheaper and more complete thaw is obtained now by using cold water in place of steam. The saving in costs with the cold water system has been sufficient to permit mining of many millions of cubic yeard of ground which had been previously considered submarginal. With all these improvements in technique the cost of stripping and thawing the ground before dredging, still exceeds the actual cost of dredging. The whole mining method by this procedure is a very inflexible one as it is of necessity spread over three years. In the first year the gold bearing gravel is stripped of overburden by hydraulicking, in the second year it is thawed, and in third, mined by dredging. Great care must be taken in planning and drilling to determine the value of

the ground beforehand as only that area which has been fully prepared can be effectively mined. The procedure entails a very considerable investment in pre-production expenses which are not found in dredging operations where permafrost is not encountered.

The adaption of the bulldozer and other earth moving equipment to placer mining has provided the independent miner with a degree of flexibility and productiveness without which he would no longer be able to operate.

In recent years there have been many improvements in dredging and earth moving equipment. Among the more important of these are the development of variable speed digging devices for dredges, and the refinement of the conveyor and bucket wheel digger in the field of earth moving. All these have found application in placer mining elsewhere and there is no doubt that, were the economic climate more favourable for gold mining, some at least, would be introduced to advantage into the gold placer industry in the Yukon. Such innovations require very considerable capital investment for which there is not the incentive at present. The steady rise in costs and the fixed price of gold have served to discourage all but the most necessary of capital expenditures and there is little incentive for costly experimentation.

In Alaska, where the physical conditions of placer gold mining are very similar to our own in the Yukon, costs are generally higher, There the placer gold mining industry has been declining in stature for many years. Production of both coal and sand and gravel have exceeded the value of gold produced in the last several years. The decline in gold production there will be accelerated in the immediate future by the closure of most of the dredges of one of the principle companies. In the Yukon the situation is by no means so critical. Several individual miners and small partnerships, who found it no longer profitable to mine in Alaska, have recently begun mining in the Yukon.

Three factors contribute to the better economic climate for placer gold mining here. These are the overall lower wage structure, the favourable exchange rate on the Canadian dollar and the payments receivable under the Emergency Gold Mining Assistance Act. In the 15 years since 1948, when this assistance was first available, over $3 million has been paid to placer gold mines in the Yukon. This is equivalent to roughly $3 per ounce produced and has been a very real support to the industry.

A recent event in the geological history of Canada was the Ice Age. During this time most of Canada was covered by a permanent ice sheet which, on melting, modified the surface features of the country into a form very similar to the one we see today. In the high latitude of the Yukon the effects of the Ice Age might be reasonably expected to be very extensive. However, this is not so. By a freak of nature the greater part of the western half ot the territory was not covered by ice at all, and in much of the eastern half only the valleys were filled with ice. The warm, damp weather which preceded the Ice Age was very conducive to the formation of placer gold deposits. These formed throughout the Yukon, with the exception of the area underlain by the soft, oil bearing rocks in the valleys of the Peel and Porcupine rivers in the North, and many have been preserved down to the present time in their original form. In other areas, such as in the Liard River Valley, around Kluane Lake, and in some of the creeks near Mayo, the form of the deposits have been modified by glaciation. Our Territorial Government has started a vigorous programme of road construction to ease access to remote areas in which minerals are known. Many of these areas contain placer deposits to which little attention has been paid for many years. The Territorial Government also offers financial assistance to prospectors and for the construction of tote roads to mining properties. The Geological Survey of Canada is well advanced with a study of the geology of the placer gold deposits of the Klondike area. These Government activities cannot but stimulate the placer mining industry and it is confidently predicted that a group of highly productive small scale placer miners will continue to fill a place in

the Yukon mining industry for many years. From all appearances however, the larger scale operation of gold dredges will cease in the late sixties. The high capital cost of re-locating a dredge is a major cause for this although there are other important economic considerations involved.

Should the increase in the price of gold come about, for which the industry has been waiting so hopefully, then increased activity in both dredging and small scale mining can be confidently expected. There are extensive areas of potentially placer gold bearing gravel which, should the incentive appear, will undoubtedly be thoroughly tested and there would be another resurgence of placer gold mining activity within the Yukon.

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